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Academic library as learning space and as collection: A learning commons' effects on collections and related resources and services

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Abstract

A tremendous amount has been written about the library as a learning space and about this model's two most popular outgrowths, the information commons and the learning commons. Little to nothing, however, has been written about how reshaping an academic/research library and repurposing library space affects the library as a collection, its resources, and its collections-related services. This study looks at the immediate impact of opening a learning commons in an academic/research library on circulation, document delivery and interlibrary loan requests for returnables, and on- and off-campus database accesses at one institution.

Keywords: Learning commons, Academic libraries, Circulation, Interlibrary loan, Database usage

Taxonomy: Library Collection Management; Assessment

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Introduction

Just over a decade ago, Scott Bennett, Yale University Librarian Emeritus and Senior Advisor to the Council of Independent Colleges, opened a 2008 editorial in *The Journal of Academic Librarianship* with a provocative question, "Who would today build or renovate an academic library without an information commons?" (2008, p. 183). While noting that the field had demonstrated some uncertainty concerning what to call its newly repurposed spaces, Bennett mused that they had become so nearly ubiquitous as to have supplanted the card catalog as the "principal means of defining space as library space" (2008, p. 183). A number of contemporaneous authors were also making note of the extent to which academic/research libraries were transforming themselves into study environments, learning spaces, collaboration spaces, makerspaces, and so forth, in which open shelves were being replaced by a variety of other student-oriented library services and non-library services (Beard & Bawden, 2012; Beard & Dale, 2010; Kao & Chen, 2011; Ludwig & Starr, 2005; Montgomery, 2014; Paulus Jr., 2011). By 2015, Bennett was opening an essay in *portal: Libraries and the Academy* by flatly asserting, "No one now plans an academic library without a learning commons" (2015, p. 215).

It would be easy, and doubtlessly tempting, for critics to dismiss Bennett's rhetorical query and his subsequent assertions as mere hyperbole on the part of an influential advocate, but as was noted he was hardly alone in having noticed the sudden appearance, fervent adoption, and widespread prominence of the information and the learning commons models. Authors in the field have traced the provenance of the library-as-commons idea to somewhat simultaneous movements and models birthed in the 1980s (i.e., Moholt's combined library and computing center, the advent of integrated library public services, the library-as-place movement, etc.). Some have traced the commons approach to shifts in learning theory that de-emphasized the university as a place for the transmission of knowledge, emphasized the collaborative creation of knowledge, and positioned the library as a complement to the classroom. Still others have traced academic/research libraries' turn to the learning spaces model by pointing directly to the development and launch of particular information commons in the 1990s and to rapidly increasing demands for additional and non-library services in the 2000s. (For a historical review of pertinent

concepts and their implementations in academic/research libraries, see: Accardi, Cordova, & Leeder, 2010; Bailey & Tierney, 2008; Bailey & Tierney, 2002; Beagle, Bailey, & Tierney, 2006; Bennett, 2003, 2007, 2009, 2015; Blummer & Kenton, 2017; Cunningham & Tabur, 2012; Forrest & Hinchliffe, 2005; Freeman, 2005; Heitsch & Holley, 2011; Ludwig & Starr, 2005; and Steiner & Holley, 2009).

Somerville and Harlan (2008), drawing on the work of Beagle et al. (2006), have suggested that librarianship's thirty-year change in perspective should be understood as an evolutionary continuum that moved from adjustment to transformation. Certainly, this fairly rapid shift led to information commons and later to learning commons being of extraordinary interest to the field, as evidenced by the literature. A January 15, 2019, search of EBSCO's *Library, Information Science & Technology Abstracts (LISTA)* database for the phrase "information commons" produced records for 536 items published between 1994 and the end of 2018, with 343 of them having been published in academic journals. A similar search for the phrase "learning commons" produced 593 records for items published between 2002 and the end of 2018, with 401 of them having been published in academic journals.

Although an impressive amount has been published on the two types of commons in the library literature in a fairly short amount of time, and although much of this literature has been favorable and enthusiastic, the adoption of the commons model in academic/research libraries has not been without conflict and controversy, especially where the re-purposing of space and the disposition of the collection has been concerned. Interested teaching faculty and librarians have, largely, divided themselves into two opposing camps. As Bennett (2003), in *Libraries Designed for Learning*, has delineated the situation, there are

> … two quite legitimate conceptions of the library as place. One of these, which has a long and worthy tradition, conceives of libraries as service places where information is held, organized, and managed on behalf of those who use it, who are often also directly assisted in their use of information by library staff. The other, which springs from a recognition of the essential social dimension of knowledge and learning, conceives of libraries as spaces where learning is the primary activity and where the focus is on facilitating the

> social exchanges through which information is transformed into the knowledge of some person or group of persons.
>
> (p. 4)

For ease of discussion, we will adopt the binary presented by Bennett as representative of the leanings of interested librarians and faculty and will refer to them throughout as the collections-oriented and learning spaces-oriented camps. These group names, and the nature of the conflict elucidated by Bennett, could certainly have been employed roughly to characterize the discussions, both formal and informal, that took place among the library administrators and librarians during the planning, development, and launch of the Adele Coryell Hall Learning Commons at the University of Nebraska-Lincoln (UNL) University Libraries in the mid-2010s.

Definition of terms

As one might expect from their recent adoption and rapidly widespread usage in the library literature, definitions of the terms "information commons" and "learning commons" have been somewhat more emergent than formal and fixed. Although a seemingly straightforward term, "information commons," for example, has been conceptualized in at least three separate ways (Bailey & Tierney, 2002). To capture the myriad of meanings for these terms as they have been employed in the literature, the authors will employ the broad definitions offered by Bailey and Tierney (2008) in their *Transforming Library Service through Information Commons*. "Information commons" should be understood as follows:

> Generally defined, the information commons is a model for information service delivery, offering students integrated access to electronic information resources, multimedia, print resources, and services. The information commons provides students the opportunity to conduct research and write their papers at a single workstation. It is a single location where one can find resources..., access numerous databases... or the library's online catalog, navigate the Internet to visit websites, and use selected software for research. Tools such as

> Microsoft Office are available, giving access to file processing and production and complementing robust e-mail, scanning, and other technological capabilities. (p. 1–2)

As Bailey and Tierney note, from the perspective of a library's patrons, the information common provides near-seamless integration of "space, services, resources, service desks, and staff" (p. 2), and from the perspective of librarians, it remains *library-centric* (i.e., "'owned' and overseen by library staff" [p. 2]).

The term "learning commons," as it has been used in the literature, has a quality of "this, and …" in its relation to the information commons as defined. As Bailey and Tierney write:

> In general, the transformation from information commons to learning commons reflects a shift in learning theory from primarily *transmission* of knowledge to patrons toward a greater emphasis on *creation* of knowledge by commons staff and patrons and patrons' self-direction in learning. A learning commons includes all aspects of the information commons but extends and enhances them.
>
> (p. 2; emphases by the authors)

Thus, the learning commons "includes all aspects of the information commons, but to a greater extent" (p. 2), but it is also not library-centric, including within its bounds "many formerly external functions and activities and extend[ing] into the former homes of these functions and activities" (p.2). As examples, Bailey and Tierney (2008) draw attention to learning commons' incorporation of faculty development centers, integration with course management systems, sharing of library space with centers for learning support and learning communities, creation of collaborative work spaces, hosting of institutional repositories, and welcoming of less-traditional functions and activities (e.g., exhibitions, performances, gaming, panel discussions). As such, the learning commons model should be understood as being more inclusive, expansive, and radically transformational than the information commons model and be understood as a conceptual, as well as a physical, space. As a result, and as one might expect, some of the field's writing on learning commons has been openly enthusiastic and aspirational in its tone.

Review of literature

To begin to resolve the issue and to better understand a learning commons' potential effects upon the collection and its related resources and services, the authors scanned for published research on the topic. Of the 401 articles retrieved using keyword search "learning commons" in *LISTA*, 94 included the terms "assessment OR evaluation OR impact OR affect OR effect" in their titles or abstracts. From these, we were able to find studies indicating learning commons increased foot traffic in libraries (Dryden & Goldstein, 2013; Yoo-Lee, Heon Lee, & Velez, 2013), had no effects upon reference services (Asher, 2017; O'Kelly, Scott-Webber, Garrison, & Meyer, 2017; Yoo-Lee et al., 2013), were gladly used by students (although not always as intended) (James, 2013), and offered amenities that students liked (Asher, 2017; Thomas, Van Horne, Jacobson, & Anson, 2015). However, we were unable to locate a peer reviewed study on the effect of a learning commons upon collections usage.

Stepping outside of learning commons literature, we discovered that only a small number of relevant studies were to be found. In 1999, Banks had sought to test whether building traffic could be used to predict usage according to circulation, catalog searches, and reference desk activity. Banks was attempting to find a solution for the distinct drop-off in visitors at her library that was attributed to the internet (p. 330). Results showed a nearly perfect correlation between building traffic and circulation (r=0.988), that led Banks to assert simply, "libraries should develop strategies for bringing people into their doors to maintain their vitality" (p. 331). A few years later, Shill and Tonner noted that over 390 major academic library facilities projects were completed between 1995 and 2002, but found no systematic or empirical analyses to support the enormous cost of the projects (2004, p. 124). Hoping to fill this gap, they first reported on the types of library projects being undertaken (2003) and then turned their attention to measuring usage of the facilities (2004). Using survey data from 182 library building projects, Shill and Tonner concluded that "in general, building improvements had a greater overall impact on basic facility use (gate count) than on circulation, reference, transaction volume, and in-house collection use" (2004, p. 127). Other researchers have offered predictive models for calculating reference transactions

based off gate counts and occupancy rates (Ahmadi, Dileepan, & Murgai, 2012; Ahmadi, Dileepan, Murgai, & Roth, 2008; Murgai & Ahmadi, 2007), but as none of the studies have considered the large spike in traffic associated with opening a learning commons, it is uncertain how applicable these models would be for libraries with these spaces.

Despite this dearth of literature on the topic, curiosity remains. In a recent study, Thomas et al. (2015) called for "future researchers [to] explore the interaction between the learning commons and other spaces and services that are contained in academic libraries. If a learning commons attracts students to the library, does that also promote usage of other library services?" (p. 811). The authors hope that the study to follow will serve as a first step in answering Thomas et al.'s call.

Setting for the study

Chartered in 1869, the University of Nebraska-Lincoln (UNL) is a land-grant university in the Midwestern United States that serves as the research university for the State of Nebraska (Knoll, 1995; Manley & Sawyer, 1969). Over the interval under study, the university enrolled between 24,000 and 26,000 students, with roughly 75% to 80% of enrolled students being undergraduates, and employed between 1500 and 1700 general regular faculty, 500 to 570 other faculty, and 5900 to 6500 administrators and staff (*UNL Fact Book*, 2017). The university's students, faculty, and administrators and staff are served by the UNL University Libraries, which "consists of Love Library and seven branch libraries [and] is the largest research library in the state. Its holdings include more than 3.5 million volumes, 46,056 current periodicals, 3.7 million microfilm pieces, over 400,000 e-books, more than 162,000 audio visual materials," and so forth (Heltzel, 2017, p. 52). As one can see from these figures, the library is sizeable both in an absolute sense and relative to the number of patrons that it regularly serves, as the collection houses over one hundred volumes per patron.

In January 2016, UNL University Libraries officially opened the Adele Coryell Hall Learning Commons (AHLC), which converted approximately 30,000 square feet within the main library that had housed some 300,000 government documents, books, and journal

volumes into a student-centered learning space. The design of this space resides comfortably within the learning commons archetype: an open concept, mixed-use environment, with a fireplace and coffee shop at its center. The space contains eighteen group study rooms, has a shared-use service point combining library assistance with computing help, and overlooks an outdoor plaza with additional gathering space. To support a diverse range of uses, distinct zones were developed including a quiet reading room for individual study, a small computer lab integrated within a comfortable seating arrangement, a flexible learning space with mobile furniture, and a digital testing center. Spaces were largely designed to support and encourage active collaboration, with approximately 75% of its 500-person total capacity oriented toward grouped configurations. The learning commons was and continues to be an enormously popular space on campus and was voted a favorite study spot by students in 2016, 2017, and 2018 ("Big Red Choice Awards", 2018). While the collections originally inhabiting the space were either reallocated to other locations in the main library and in off-site storage or were deaccessioned, spaces for small "boutique" collections were designated within the AHLC around five categories: popular fiction, popular science, research and writing tools, new books, and careers.

In the months preceding and the months during the remodeling of the portions of the main library building that would come to house the learning commons, there was a great deal of discussion and debate, some of it quite heated, within the library concerning the learning commons and its potential effects for good or ill. Library administrators and librarians who were more learning spaces-oriented argued for the aesthetic qualities of the newly remodeled space and pointed to research on collaborative learning, to research on students' desires for library spaces that suited their needs, to research on learning outcomes, and to research and anecdotes from peer institutions concerning how learning commons greatly increased foot traffic in academic/research libraries. When librarians who were more collections-oriented expressed concerns over how the learning commons would affect the library in its role as the research hub of the campus, the learning spaces-oriented camp predicted that the more attractive space, with its services and study rooms intended for students, would bring more patrons into the library, especially new patrons

whose needs were not being met by the traditional library. This influx, they argued, should result in an increase in the circulation of the main library's books and an increase in the on-campus use of the library's databases. Additionally, the creation of small, browsing "boutique" collections in the remodeled space intended to meet students' non-scholarly needs and wants – popular fiction and popular science collections, a career services collection, and so forth – should also result in pockets of high-circulation books within the library's circulating collection. The learning commons, as a draw for students, should and would have numerous positive impacts on the usage of the collections and of collections-related resources.

The more collections-oriented librarians felt that the learning spaces-oriented camp's optimism was misplaced. They countered that the new "library patrons" would not be library patrons at all (i.e., would not be users of scholarly resources), so the projected increases in foot traffic would not produce increases in circulation. In point of fact, they argued, the influx of non-scholarly patrons into the building would render it unattractive to its primary, traditional, and most dedicated customers (i.e., serious scholars) and drive them away. Since serious researchers would be avoiding the building, rather than experiencing an increase in on-campus database accesses, the University Libraries should see a sharp reduction in on-campus accesses and a corresponding spike in off-campus accesses. Moreover, they contended, as the re-purposing of the space for the commons would necessitate the relocation of tens of thousands of items to remote storage and the deaccessioning of tens of thousands more, the learning commons would lead to substantial increases in both document delivery requests for locally held items that had been relocated to storage and interlibrary loan (ILL) requests for books that had been removed from the collection.

Of course, as was noted above, upon searching the literature, the authors discovered that there was little to no empirical support for either position. Given the enormous amounts of money, space, and other resources that academic/research libraries, including the UNL University Libraries, have devoted to learning commons, it seemed clear to the authors that the learning-spaces versus collections debate would benefit from the support of empirical research.

Research questions

As was noted above, Thomas et al. (2015) identified one of the unaddressed questions in the library literature on learning commons as being whether the influx of students that learning commons attract has promoted the use of other library services. At the UNL University Libraries, a great deal of interest had centered on the learning common's potential impact on the library as a collection, and with good reason as recent research had shown that use of the library's materials was positively associated with student success at UNL (Allison, 2015). Thus, we were moved to inquire whether, after the launch of the learning commons, there were real, substantial changes, in the use of collections and of collections-related resources and services that could plausibly be attributed to the opening of the learning commons.

Due to the complexity of this primary question, we approached this main inquiry through a battery of lesser questions. These subordinate questions were guided by the debates of and concerns voiced by the local learning spaces-oriented and collections-oriented camps. As such, the first question that should be addressed would be whether the library's door counts (i.e., foot traffic) did increase after the opening of the learning commons. If the answer to this question was negative, then many, if not all, of the assumptions and contentions of the learning spaces-oriented librarians and faculty concerning a learning commons' effects and how an academic/research library functions would be rendered moot.

If this first question provided an answer in the affirmative, then the second question to be raised would be whether or not the circulation of books and other physical materials likewise increased. However, prior to addressing the issue of an increase in circulation, we first needed to establish whether there is a meaningful association between library foot traffic and circulation counts. Another pertinent question of interest would be whether and how this relationship changed, if it exists, after the opening of the learning commons.

The third question that we would like to address grew out of discussions of the reclaiming and repurposing of library spaces. The learning commons claimed an entire floor of the university's main library building, which necessitated the relocation of tens of thousands of government documents, books, and journal volumes to storage and the deaccessioning (i.e., "weeding") of tens of thousands more. As

some predicted a resultant increase in document delivery requests for locally held but relocated and stored items and in ILL requests for the books that had been weeded from the collection, the third question that we address will concern whether this outcome eventuated.

The fourth question concerns database accesses. As was noted above, the learning spaces-oriented were of the opinion that the influx of students into the building should lead to an increase in on-campus use of the library's electronic resources, such as its subscription databases. Their counter argument being that the transformation of the space would render the building unattractive to serious scholars, so the opening of the learning commons would lead to scholars working elsewhere and to a sharp increase in off-campus accesses of the library's databases instead. We will inquire whether either scenario occurred.

For the study's fifth and final question, we will address the learning commons' advocates' aforementioned argument in favor of creating small, browsable "boutique" collections of popular materials aimed at undergraduates in the space. This argument had suggested that such collections would create pockets of highly circulating books in the collection. Early internal reports supported this assumption, at least insofar as the popular fiction collection was concerned, so we sought to test whether the observed effect ought to be attributed to the location rather than to the titles themselves. To isolate the effect of location and control for the effect of the titles, for the final question of the study, we inquired whether duplicated titles held in the learning commons' browsable "boutique" collections out-circulated the copies of these titles located in the main library's circulating collection stacks, which are open to the public and are browsable as well.

Methods and data

To assess for the possible effects of opening a learning commons upon the library-as-collection, we performed a secondary data analysis of machine count data automatically collected by the UNL University Libraries for internal reporting purposes. The data collected were comprised of foot traffic counts collected by the main library's gates, of monthly and annual circulation totals collected by the online catalog, of counts of document delivery and ILL requests for returnables

collected by the ILLiad system, and of counts of online database accesses by point of origination by the library's proxy server. Data were collected for the periods before and after the opening of the learning commons, (i.e., pre- and post-commons periods), and all counts were tallied and analyzed as monthly totals, with the exception of the circulation data analyzed for research question #5, which were annual totals for two separate locations within the main library building (i.e., "boutique" collections versus the stacks). Prior to analysis and testing, we engaged in model fitting of the data and then selected the appropriate techniques and tests for the study's research questions whose analysis was informal.[1]

1. Note on the statistics: Since the analyses to be performed in this study were going to be employing counts, we were initially inclined to employ the Poisson distribution, but model fitting showed a great deal of overdispersion in the data, which lead us to consider the negative binomial distribution (Zhu & Lakkis, 2014). Further goodness-of-fit testing discovered that the Pearson χ^2/degrees of freedom fit statistic when employing the negative binomial distribution was very close to 1.00, the desired statistic, in almost all cases (i.e., the tests checked for departures from conditions of relative homogeneity between the theoretical distribution of the model and the empirical distribution of the data and found very little). Thus, the model would seem appropriate (D'Agostino & Stephens, 1986). For those interested, calculated values were as follows: Table 2 Pearson χ^2/DF=0.95; Table 3 Pearson χ^2/DF=0.96; Table 4 Pearson χ^2/DF=1.01; Table 5 Gen. χ^2/DF=0.99 (scaled data); and Table 6 Pearson χ^2/DF=1.22. Table 7 employed the normal distribution (see final paragraph below).

   All counts were analyzed as tallied with two exceptions. First, for the regression analysis performed for research question #2, we provided Spearman coefficient of rank correlations rather than the more common Pearson product-moment coefficients. Pearson's correlation measures have several strict assumptions (e.g., normality, linearity, uniform variance for all variables, etc.) and since this study's variables were all counts, the assumptions probably would not hold. Fortunately, the Spearman correlation does not make as many assumptions concerning the distribution of the data and only requires that the relationship between variables be monotonic (Field, 2013).

   Second, adjustments had to be made to the data for the analysis of on-campus database accesses (i.e., research question #4). When we attempted to run an analysis of this data using the negative binomial distribution as a model, we were not able to do so due to the large variances discovered, so we were required to scale responses before proceeding. Responses, therefore, were scaled by 100,000. During the analysis, we noted a large separation in the residuals, which we assumed was likely due to group differences. Upon testing for homogeneity of variances, we found that the variances for the two groups differed significantly for on-campus database accesses, but not for off-campus accesses. *(continued)*

Results and analysis

The above represent a sizeable number of research questions to pose in a single article, and they promise to produce a small avalanche of numbers. To improve readability, the results of our statistical analyses and our interpretations are offered in this single section, rather than separately.

Research question #1:
Did foot traffic at the main library building increase substantially?

After the opening of the learning commons, there was so obviously a great increase in foot traffic in the post-commons period that it hardly warrants formal statistical analysis. In the several months of the pre-commons period for which we were able to retrieve data (n=29), the average number of patrons entering the building was 47,112.758 per month, with a recorded low tally of 19,983 and a recorded high of 72,202. In the 13 post-commons months, average foot traffic, at 78,534.15 patrons counted per month, was slightly higher than the pre- commons period's highest mark. This outsized surpassing of the pre-commons period's performance occurred despite the fact that the post-commons average contains one month (February of 2016) wherein the library's gates experienced a myriad of malfunctions and recorded just 6064 patrons as having entered the building. If one were to remove this malfunction-plagued month from the dataset, the post-commons period's average would climb to 84,573.33 patrons per month, with a new low count of 36,543 and a high count

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Therefore, we allowed covariance parameters to vary by group. These and all analyses, excluding those for research questions #1 and #5, were performed using the Statistical Analysis System integrated software suite (SAS Institute Inc. 2015, version 9.4 m3).

Finally, we employed a slightly different approach for research question #5. For this question, we were comparing the simultaneous circulation performances of two identical groups of titles located in two different publicly accessible locations in the main library, and the data for the titles were year-to-date totals gathered since the launch of the commons. Thus, the nature of the question and of the data suggested that a paired sample *t*-test employing the normal distribution would be appropriate and sufficient (McDonald, 2009). This analysis was performed using IBM Corporation's Statistical Package for Social Sciences (SPSS version 23).

of 164,633. Thus, without the error-plagued month, it would appear that the main library experienced a nearly 80% increase in foot traffic after the launch of the learning commons, an unquestionably substantial post-commons increase. (Note: despite the obvious measurement error, February of 2016 has not been removed from the datasets and models used in the analyses to come).

Research question #2:
Was there an increase in circulations that could reasonably be attributed to the opening of the learning commons?

As was noted above, this question rests upon an assumption that has rarely been examined: that there is an association between foot traffic at the library and the circulation of materials. So, before turning to the analysis of whether or not monthly circulation counts increased, we sought to discover whether an XY relationship exists between these two variables. To explore this issue further, we also looked separately into the relationships between these variables in the pre- and post-commons periods to determine whether the launch of the learning commons might have changed the relationship, should it exist. Last, to assess the potential impact of the commons, we then tested for a pre- and post-commons difference in monthly circulation tallies.

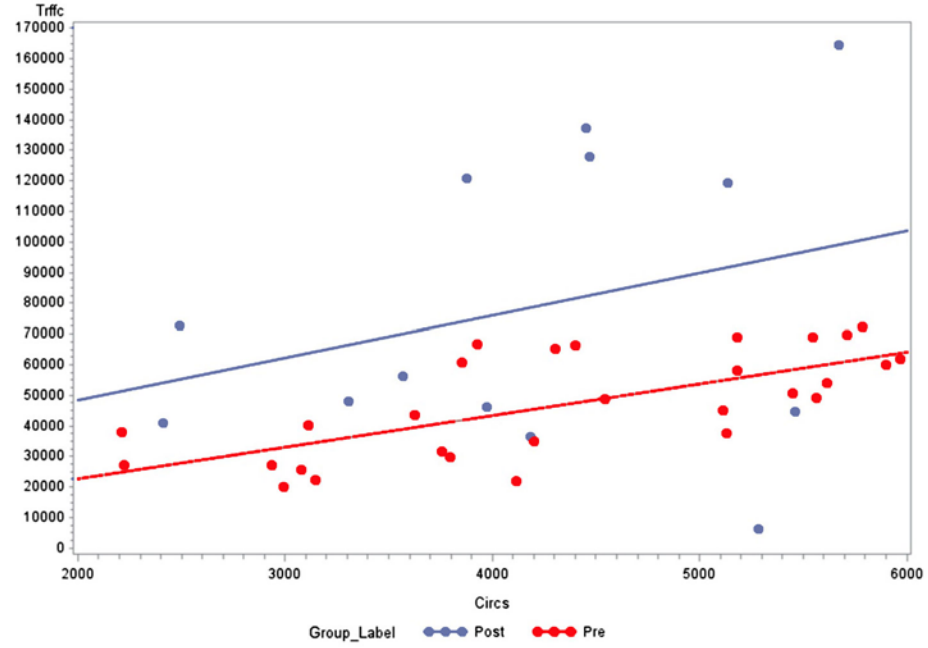
To begin this more formal portion of the analysis, we employed negative binomial regression analysis, reporting Spearman coefficients, to look for a simple XY relationship between foot traffic and circulations in the dataset as a whole and separately for a relationship in the pre- and post-commons periods. The nature of the relationship between library foot traffic and circulations at the campus's main library and the natures of the pre- and post-commons relationships may be understood by referencing Table 1. In the first portion of the table, the Spearman correlation coefficients show the association between the two variables in the dataset overall was strong and was statistically significant (r=0.48, p=.0015). The association for the 29 months preceding the launch of the learning commons also was very strong and statistically significant (r=0.71, $p < .001$). The relationship in the 13 months post-commons, however, revealed a much weaker correlation, and the association's p value indicates the likely presence of noise or chance (r=0.19, p=.53).

Table 1. Association between foot traffic and circulations: overall and pre- vs. post-commons.

Spearman Correlation Coefficients (XY Relationship)
(Prob > |r| under H0: Rho = 0)

Dataset	$N_{(months)}$ =	*Traffic:Circulation*	$p \leq 0.05$
Overall	42	0.47535	0.0015
Pre-Commons	29	0.71068	<.0001
Post-Commons	13	0.19231	0.5291

Foot Traffic vs. Circulations Plotted by Group



Spearman Partial Correlation Coefficients (XY Relationship), Controlling for Month Order
(Prob > |r| under H0: Rho = 0)

Dataset	$N_{(months)}$ =	*Traffic:Circulation*	$p \leq 0.05$
Overall	42	0.60209	<.0001
Pre-Commons	29	0.77179	<.0001
Post-Commons	13	0.73718	0.0062

The relationships can be seen by reviewing the graph in the center of the table. The regression line for the pre-commons months (i.e., the red line) clearly slopes upward as Foot Traffic and Circulations increase, and one can see from the positions of the pre-commons data points (i.e., the red circles) around this line that the pre-commons

residuals appear to be comparatively small (i.e., they hug the line quite closely) and appear to exhibit comparatively little variability. The differences between the pre-commons and post-commons associations seem to be quite sharp. The post-commons regression line (i.e., the blue line) also slopes upward as Foot Traffic and Circulations increase, but the post-commons data points (i.e., the blue circles) have comparatively large residuals and are widely scattered around their regression line. From this, one can infer that a relationship between Foot Traffic and Circulations at the main library exists in both intervals and that a clear and likely real relationship existed prior to the opening of learning commons. However, one must be more cautious in interpreting this relationship after the opening of the learning commons. The post-commons data suggest that it is likely that a sizeable number of the library's new patrons have been visiting the building for reasons other than to check out books.

Before proceeding to the next questions, there could be other factors contributing to the library's circulation totals and to acknowledge that simple XY regressions fail to take into account that complex network of potentially contributing factors. For example, as the school year exhibits a certain pattern as it progresses, a predictable ebb-and-flow, time could act as a confound for our analysis. To test this expectation, we re-analyzed the data, looking for partial correlations and controlling for month order, with January set to one and December set to 12. From the results of this second analysis, reported in Table 1 just below the graph, one may see that the full dataset and the two pre- and post-commons subsets produced Spearman correlation coefficients that suggest very strong associations, and all relationships were statistically significant, although the post-commons correlation's *p* value was not quite as pronounced. Thus, our earlier analysis and conclusion should be tempered somewhat. The Foot Traffic and Circulations relationship would seem fairly solidly to exist at the main library. The post-commons relationship, while being a bit less clear than the pre-commons relationship, is still very probably real.

Having established the likelihood of there being a real relationship between Foot Traffic and Circulations, the much more important and interesting question becomes, Did the large increase in patron visits produce a comparably large change in the main library's monthly circulations? From a quick review of the results presented in Table 2,

Table 2. Circulation differences: pre- vs. post-commons.

Type III tests of fixed effects

Effect	*Num DF*	*Den DF*	*F value*	*Pr≥F*
Group	1	40	0.23	0.6351

Group Least Squares Means

Group	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*	*Mean*	*S.E. mean*
Pre-	8.3796	0.04948	40	169.34	<0.0001	4357.38	215.62
Post-	8.3371	0.07391	40	112.80	<0.0001	4175.92	308.66

Differences of Group Least Squares Means

Group	*Group*	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*
Pre-	Post-	0.04254	0.08895	40	0.48	0.6351

the reader can see that it did not. The miniscule *F* value (0.23) and large probability value (0.64) for the tests of fixed effects reported at the top of the table suggest that there was not a statistically significant difference to be found in the data. In fact, if one peruses the values in the "Group Least Squares Means" portion of the table, one will see that mean monthly circulation (4357.38) actually decreased after the opening of the learning commons (4175.92). Likewise, the post-hoc pre- and post-commons test of differences reported in the bottom portion of the table also shows no statistically significant difference in performance between periods, with the *t* value being small (0.48) and the probability value being large (0.64). Therefore, despite the strong association between Foot Traffic and Circulations discovered above, one must conclude that the massive influx of patrons that followed immediately upon the opening of the learning commons had no noticeable effect at all upon the main library's circulation counts. There most definitely has been an increase in the number of patrons entering the building, and, as Banks (1999) discovered, there would definitely seem to be a strong relationship between Foot Traffic and Circulations, but, in opposition to Banks's suggestion, the post-commons increase in Foot Traffic does not seem to have boosted the circulation of the main library's materials at all.

Research question #3:
Did the numbers of document delivery and interlibrary loan requests for borrowable/returnable items increase in the post-commons period?

Since this research question involves request data for roughly equivalent services provided by the UNL University Libraries' Delivery & Interlibrary Loan department, we elected to examine the two types of requests together. As was noted above, the remodeling of the space that was to become the learning commons necessitated the removal of the space's books and shelving. Unfortunately, there was not enough space to house these books elsewhere within the main building, nor was there enough remote storage space available for all of them. This resulted in the main library having simultaneously to undertake both a sizeable relocation project and a sizeable deaccessioning, or "weeding," project with short timelines for completion. To ensure that the projects would be completed in a timely manner, it was determined that quantitative characteristics (e.g., circulations, renewals, etc.) of the books would be used to identify titles for either storage and/or removal, with the library's subject liaisons being given brief periods to identify books that should not be relocated or removed from the collection. The books identified for potential inclusion in the projects were those with call numbers in the *Q – Science* through *Z – Bibliography. Library Science. Information Resources (General)* Library of Congress classifications published between the end of World War II and a decade prior to the projects' start (i.e., 2004). Much of the Libraries' pre-WWII collection had already been relocated to remote storage during prior projects, and weeding of that facility would have proven prohibitively labor-intensive and time-consuming, so these books were not considered for inclusion in the projects. Books with two or more total circulations since the launch of the online public access catalog in 1992 or acquired since were slated for review for relocation to storage, and books with one or fewer circulations during the same interval were tagged for potential weeding.

So, did the removal of tens of thousands of comparatively well-circulated books to remote storage facilities produce a sharp increase in document delivery requests for locally held items? The answer, as Table 3 shows, is that it did not. The authors were supplied with data on document delivery requests made during the 2009–2010 school year

Table 3. Document delivery requests for locally held items: pre- vs. post-relocation.

Type III tests of fixed effects

Effect	*Num DF*	*Den DF*	*F value*	*Pr≥F*
Group	1	94	0.80	0.3736

Group Least Squares Means

Group	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*	*Mean*	*S.E. mean*
Pre-	7.2786	0.02731	94	266.52	<0.0001	1448.90	39.5684
Post-	7.3179	0.03448	94	212.27	<0.0001	1507.00	51.9539

Differences of Group Least Squares Means

Group	*Group*	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*
Pre-	Post-	−0.03932	0.04398	94	−0.89	0.3736

through to the end of the 2016–2017 school year (i.e., 96 months in total: 59 preceding the start of the relocation project and 37 following). As one may see from the table, the testing of the data produced small *F* (0.80) and *t* values (−0.89), and probability values (0.37) that were too large to support a conclusion that there was any sort of a statistically significant change in document delivery requests. The reported means do show an increase in the average number of requests in the post-commons months of roughly 58. This is a difference, but not one that was statistically significant or that could be characterized as a discernible increase.

The other half of this pair of questions involves evaluating interlibrary loan (ILL). Did the deaccessioning of thousands of comparatively little-circulated books from the collection result in an increase of ILL requests for borrowable/returnable items? The ILL data supplied covered the same time period as did the document delivery data just analyzed, excluding data from 2010, which had been lost in a system migration. As Table 4 shows, the ILL data do exhibit a statistically significant difference in ILL requests before and after the beginning of the projects, but the data show a decrease instead of an increase in borrowing. Mean requests for borrowable/returnable materials actually decreased by approximately 565 requests, a statistically significant difference.

Table 4. ILL requests for borrowable/returnable items: pre- and post-"weeding".

Type III tests of fixed effects

Effect	*Num DF*	*Den DF*	*F value*	*Pr≥F*
Group	1	82	20.33	<0.0001

Group Least Squares Means

Group	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*	*Mean*	*S.E. mean*
Pre-	7.9740	0.03183	82	250.52	<0.0001	2904.32	92.4420
Post-	7.7576	0.03590	82	216.06	<0.0001	2339.27	83.9909

Differences of Group Least Squares Means

Group	*Group*	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*
Pre-	Post-	0.2164	0.04798	82	4.51	<0.0001

Before proceeding to the next questions, we would like to caution the reader not to conclude too much from the above results. The materials removed from the main library that failed to produce the expected, perhaps even desired, effects were almost entirely older books from the sciences, medicine, agriculture, military and naval sciences, and library and information science. From this analysis, we would not necessarily predict a similar result if the library were to relocate and/or weed books from the arts and humanities, business, education, or the social sciences.

Research question #4:
Did on-campus and off-campus database access counts decrease and increase, respectively, as predicted pre- and post-commons?

As with the prior questions, the data for this research question are closely related in how they were collected, and in this case it was predicted that the data would move simultaneously in opposite directions, so we will also address the questions as a pair. First, we looked into whether the addition of more patrons into the building due to the learning commons corresponded to an increase or decrease of on-campus usage of the library's online databases. Then, we examined whether the remodeled space and its new patrons discouraged traditional researchers away from the library and produced a surge in off-campus usage of the library's online databases.

Table 5. On-campus database accesses: pre- vs. post-commons.

Type III tests of fixed effects

Effect	*Num DF*	*Den DF*	*F value*	*Pr≥F*
Group	1	46	20.53	<0.0001

Group Least Squares Means

Group	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*	*Mean**	*S.E. mean*
Pre-	2.9870	0.05719	46	52.23	<0.0001	19.8270	1.1339
Post-	2.1482	0.1761	46	12.20	<0.0001	8.5696	1.5090

Differences of Group Least Squares Means

Group	*Group*	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*
Pre-	Post-	0.8388	0.1851	46	4.53	<0.0001

* Means in 100,000 accesses. Data were overdispersed, so responses were scaled.

As shown in Table 5, there was a statistically significant change in the number of recorded on-campus database accesses pre- and post-commons, but the change was not in the direction predicted. Upon review of the scaled mean values reported, one can see that the mean number of accesses in the post-commons months (856,960) were less than half of the mean accesses in the months preceding (1,982,700). Whether or not the decrease is attributable to the opening of the learning commons or, possibly, an unidentified collection error in the data obtained for analysis is impossible to determine here, but the campus's on-campus utilization of the library's links to its databases certainly seems to have plummeted over the interval by an alarming amount. Whatever else the learning commons' influx of patrons may have been doing in the newly renovated space, they appear not to have been accessing the library's online databases.

The question, then, becomes whether the massive disappearance of on-campus accesses discovered above produced a compensatory increase in database access counts from off-campus? As Table 6 shows, the mean numbers of off-campus database accesses pre- and post-commons were nearly statistically identical. The *F* value for the tests of (0.06), as was the *t* value (0.24) for post-hoc comparison of the pre- and post-commons tallies, and the corresponding *p* values (0.81) were quite large. In essence, nothing happened with the library's off-campus

Table 6. Off-campus database accesses: pre- vs. post-commons.

Type III tests of fixed effects

Effect	*Num DF*	*Den DF*	*F value*	*Pr≥F*
Group	1	46	0.06	0.8102

Group Least Squares Means

Group	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*	*Mean**	*S.E. mean*
Pre-	1.9814	0.08236	46	24.06	<0.0001	7.2528	0.5974
Post-	1.9487	0.1075	46	18.12	<0.0001	7.0193	0.7547

Differences of Group Least Squares Means

Group	*Group*	*Estimate*	*S.E.*	*DF*	*t value*	*Pr≥|t|*
Pre-	Post-	0.03272	0.1354	46	0.24	0.8102

* Means in 100,000 accesses. Data were overdispersed, so responses were scaled.

database accesses. The average number of monthly on-campus database accesses may have dropped by more than one million, but they did not reappear as off-campus accesses. Rather, post-commons off-campus accesses remained statistically unchanged, showing just a comparatively small drop of roughly 23,000 accesses per month.

Research question #5:
Did books located in the learning commons' "boutique" collections out-circulate their counterparts located in the main library's open stacks because of location effects?

To close the study's analyses, we looked into whether books located in the learning commons' browsable, tailored "boutique" collections circulated more than did copies of the same books located in the main library building's open stacks. A natural assumption is that creating browsable, customized collections geared toward the interests of patrons should result in pockets of highly circulating materials in the collection. Indeed, early circulation count data in internal reports did suggest that the books in the "boutique" collections of the learning commons, particularly in the popular fiction collection, were circulating well. However, the question remained whether it was the attractiveness of the location or of the books themselves that was driving circulation.

Table 7. Circulation of duplicate titles by location: learning commons vs. library stacks

Paired samples statistics

Locations	*Mean*	*N*	*Std. deviations*	*S.E. Mean*
Commons	2.163	49	2.1050	0.3007
Stacks	2.469	49	2.7165	0.3881

Paired samples correlations

Pairs	*N*	*Correlation*	*Significance*
Commons & stacks	49	0.591	0.000

Paired samples test

Pairs	*Mean*	*Std. deviation*	*S.E. mean*	*DF*	*t value*	*Significance (2-tailed)*
Commons & stacks	−0.3061	2.2473	0.3210	48	−0.954	0.345

To address this question and to control for the effects of the books themselves, we identified 49 non-reference titles present both in the learning commons' collections (mostly in the popular fiction collection) and in the main library's open stacks. Year-to-date circulation totals for the post-commons period were drawn from the library catalog for these titles, and their mean circulations for each location were compared. As one can see from the results of the paired samples *t*-test reported in Table 7, the paired samples were strongly correlated, and there was no statistically significant difference between the books' performances that could be attributed to their locations within the building, $t\ (48)=-0.954$, $p=.345$. On average, the main library's stacks copies ($M=2.469$) actually circulated a bit more than did the learning commons' ($M=2.163$), although not by a statistically significant amount. Forty-nine is, of course, a small number of titles, and it would have been preferable to have had a larger sample for this question. Still, we can conclude from the analysis that it may not be the learning commons location alone that has been driving the "boutique" collections' rate of circulation.

Thus, one can see from the above that, contrary to the predictions of both camps in the local learning spaces versus collections debate, very little actually happened after the opening of the learning commons at the UNL University Libraries' main library, and when changes

did occur, with the exception of the change to the library's door counts (i.e., Foot Traffic), they generally did not happen in the direction nor to the extent that either side of the debate had predicted. The opening of the learning commons did bring more people into the building, but the sizeable increase in people passing through the library's gates did not produce a commensurate increase in the circulation of library materials or in on-campus accesses of the library's online subscription databases. In essence, the library's metrics show that many more people have been entering the building, but these people do not seem to be coming to the library to use its collections and collections-related resources and services. Ultimately, the learning commons' "boutique" collections may be generating higher than average amounts of circulation, as early internal reports have indicated, but there is as yet nothing to suggest that this higher circulation results from the books' location rather than from the character of the books themselves. It is entirely possible that had the "boutique" collections' titles been located in the library stacks rather than in the learning commons they would circulate just as much.

Of note, the changes made to the collections' spaces to make way for the learning commons and for the influx of new patrons did not appear to be too disruptive. The removal of items to remote storage facilities and the weeding of items from the collection did not produce a significant increase in requests for locally held items or for items that had been weeded. The influx of new patrons also did not result in the library's traditional patrons moving off campus to access the library's collections-related resources remotely in any noticeable way. The metrics collected and analyzed here essentially support the arguments of neither the learning spaces-oriented nor collections-oriented camps concerning the impact of a learning commons upon the usage of an academic/research library's collection. Instead, the proper conclusion concerning the impact on usage of collections materials, collections-related resources, and collections-related services is that the learning commons has had, as yet, little to no observable effect at all.

Limitations to the study

The first limitation to this study is one that frequently limits the generalizability of library science research: this study was a single study

conducted at a single site and was not conducted under laboratory conditions. Although this study does have some of the elements characteristic of quasi-experimental research in that we were able to manipulate an independent variable and test for pre- and post-manipulation effects, we were not able to randomly assign participants to other conditions (e.g., we were not able to instruct another similar institution not to open a learning commons in order to compare outcomes), nor were we able to control or deliberately manipulate potential variables of interest. As a result, it may well be that there were characteristics of this study's setting that could have produced effects that would not be evident in a different setting. For example, the UNL University Libraries' physical holdings, as was noted above, are relatively sizeable, only older books in certain subjects were removed from the public shelves, and so forth. A relatively smaller library, one that had to relocate and/ or remove newer books, or one that had to remove a greater percentage of its collections could well experience different outcomes. It is possible that a project that relocated and/or "weeded" more humanities and social sciences books would produce different outcomes (McAllister & Scherlen, 2017). Thus, the results of this study are not generalizable, nor does the study provide deep causal explanations for the effects observed. However, there remains the possibility that its results may prove general with repetition elsewhere.

A second limitation of the study would be the intervals under examination. Post-commons data were mostly drawn just for the 13 months after the learning commons opened, so our analyses and conclusions may only reflect the immediate effects of a learning commons on collection circulation and on usage of collections-related resources and services. As former psychiatrist David Hoban has advised in another context, one must "[a]llow for delayed impact" (2014, p. 139). While it is currently the case that it has had little or no impact on the selected library services reviewed here, the learning commons may well manifest a greater impact over time or at some point in the future.

The selection of services analyzed herein represents a third limitation to the study in that we analyzed only these library services and no others. In-house usage of materials and usage of other important library services, such as reference services, were not analyzed. In this particular case, such analyses simply were not feasible. The UNL University Libraries do not regularly collect detailed, granular statistics for in-house usage of materials. Also, while preparing for the

opening of the learning commons, the UNL University Libraries were making changes to service points, experimenting with new staffing schedules and models, and so forth. It would have been impossible to have kept track of all of these changes as they were happening and to parse their effects on reference services from the potential effects of the learning commons. A library that regularly tracks other types of collections usage or a library with a more rigidly compartmentalized, ordered, and managed set of changes to its service points could, one hopes, add much to the discussion of the potential impact of a learning commons on other library services.

A fourth, and potentially very fruitful, limitation of this study lies in the primary shortcoming of our approach. For this study, we took an analytical, quantitative tack that merely assessed the potential impact of the learning commons on collection circulation and on the use of collections-related resources and services. We did not take a qualitative or mixed-methods approach and follow up with focus groups or interviews of learning commons patrons or non-patrons. As a result, we know that changes in the circulation of the collection and in utilization of collections-related resources and services did or did not occur over the interval studied, but we have little or no knowledge concerning why. For example, regarding on-campus and off-campus database accesses, we know that the number of tallied on-campus accesses decreased precipitously without a complementary spike in off-campus access. We do not know, however, where these accesses disappeared to. One distinct possibility is that our on-campus patrons may be using search engines to find our databases and other e-resources, thus bypassing the UNL University Libraries' links entirely, but this has not yet been investigated.

Also, for this study the authors did not employ qualitative methods to inquire after the new learning commons patrons and their experiences using the space. As this study shows, there have been a lot of people in the building, but we did not ask them what they have been doing, what aspects of the learning commons contribute to or detract from their learning and academic success, what about the learning commons contributes to various student outcomes, and so forth. A publication focusing on this aspect of the commons is currently under review (DeFrain & Hong, 2019).

Fifth, and finally, this study, by being limited to a single site, can provide no insight into the effects of the widespread shift in emphasis

in the field of academic/research librarianship toward learning spaces and away from collections spaces. It is entirely possible, perhaps even likely, that the repurposing of library spaces will produce unintended consequences via negative network effects in the short term and impact historical research over the longer term. Primarily, we are thinking here of the repurposing of library spaces and the massive collection relocations and weeding projects that can accompany the development of a learning commons. Obviously, if enough libraries weed enough older monographs, the titles that each library weeds will not be as available today for borrowing via interlibrary loan. Again, this is more a potential product of widespread weeding than of creating a learning commons, but as more and more libraries reclaim and repurpose collections spaces as learning spaces, unintentionally manufactured scarcity could become problematic. As some have begun to argue, if academic/research libraries continue to accelerate the current trends, the repurposing of library spaces may shift the core mission of academic/research libraries away from collecting, preserving, and providing access to collected scholarship in physical form (Megarrity, 2010; Scherlen & McAllister, 2019). This, in turn, will threaten how academic/research libraries have traditionally built and curated collections and will affect the future availability of historical evidence and of primary source materials, especially in the form of monographs (Morris & Presnell, 2019). These last are issues of great import that the field must address, but they are issues well beyond the scope of this particular study.

Conclusion

Academic/research libraries seem to have been at something of a crossroads for a while now where the utilization and repurposing of library spaces is concerned, and two very passionate and opposed values-driven camps have coalesced around these issues. The learning spaces-oriented see the present moment as an opportunity to express and act on their values, to re-envision and remake the academic/research library in ways that will boost student learning and student achievement. The collections-oriented, on the other hand, see their values as being threatened and their concerns as being cavalierly dismissed. The members of this traditionally-minded camp see

the library as an enduring symbol of knowledge and the worth of individual scholarship and see the library collection as a vital resource (Mak, 2007; Mann, 2007). Thus, weeding has not infrequently led to expressions of anxiety, anger, and sadness from members of the faculty (Agee, 2017). In some instances, it has even ignited resistance and backlash, as some faculty have strong and long-held views on what an academic library is, on how academic libraries ought to apportion their resources, and on how they ought to look (Becker, 2015; Demas, 2005; James, 2013; Mann, 2007; Straumsheim, 2014, 2017). One may sense this informing the following statement from Foster and Gibbons (2007):

> We are designing technology, spaces, and services for an academic library, not a summer camp, a fitness center, or an airport. Students may want to eat in the library, socialize in the library, and sleep in the library, and we may want to make that possible. But they can do those things elsewhere. There are somethings they can only do in the library; those things must have priority. (p. 82)

We understand that it can be difficult not to argue from the heart for one's beliefs and values – with "fury" in one professor's words (Howard, 2009). But to begin actually to understand the impact of learning commons on academic/research libraries and their patrons, continued quantitative, qualitative, and/or mixed-methods studies and empirically supported conclusions will be necessary, and it is these that should shape our discussions, debates, and conclusions. In our review, we were quite surprised to discover so few of the learning commons' detractors and critics employing research from the library literature to bolster their arguments. For example, there is a large and growing research literature on student use of and preferences for these newly built/repurposed library spaces that suggests that students primarily use these spaces for individual study or, to a slightly lesser extent, for group study, which would support the conclusion that some of the current emphasis on formal/structured collaborative workspaces and on social spaces may be misplaced (Andrews, Wright, & Raskin, 2016; Applegate, 2009; Archambault & Justice, 2017; Bailin, 2011; Bryant, Matthews, & Walton, 2009; Cha & Kim, 2015; James, 2013; Lux, Snyder, & Boff, 2016; Thomas et al., 2015; Yoo-Lee et al.,

2013; Young & Kelly, 2018). As well, analysis of faculty use of library spaces, unsurprisingly, supports the conclusion that faculty use them mostly for scholarly work and for quiet contemplation (Antell & Engel, 2006, 2007), which suggests that academic/research libraries' most ardent users are not being well served by the changes currently being made to library spaces. It is our hope that this study will prove to be a useful entry in the field's research literature on learning commons and a seed for future articles on learning commons and their impacts upon academic/research library collections and collections-related resources and services. The library literature to this point appears to support the conclusion that opening a learning commons will attract more people to the library, but, as this study shows, this seems to be no guarantee that these people will be there to check out books or to use other collections-related resources and services. Although it is far too soon to conclude with certainty, this study suggests that the opening of a learning commons in an academic/research library could well have little or no measurable effect upon academic/research library collections use at all.

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